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IET,Dr. Shakuntala Misra National Rehabilitation University, Lucknow

Department of Computer Science and Engineering

Sessional Test - 1

Sem & Year: 4 th & 2nd **Session: 2023-24**

Subject : Design And Analysis of algorithms **Code: -TCS-402**

Duration:90 Minutes **Max Marks:20**

Section – A

1. Answer all the following questions. **(4×1=4 Marks)**

(i)Which factor is NOT considered in the performance measurement of an algorithm?

a) Time complexity b) Space complexity c) Energy consumption d) Input size

(ii) What does the worst-case behaviour of an algorithm refer to?

a) The scenario where the algorithm performs optimally.
b) The scenario where the algorithm takes the least amount of time to execute.
c) The scenario where the algorithm performs the worst in terms of execution time.
d) The scenario where the algorithm has unpredictable behaviour.

(iii) Which of the following is true about merge sort?

(a)Merge Sort works better than quick sort if data is accessed from slow sequential memory.

(b)Merge Sort is stable sort by nature

(c)Merge sort outperforms heap sort in most of the practical situations.

(d)All of the above.

(iv) Let P be a Quick-Sort Program to sort numbers in ascending order using the first element as pivot. Let t1 and t2 be the number of comparisons made by P for the inputs {1, 2, 3, 4, 5} and {5,4, 3, 21} respectively. Which one of the following holds?

(a) t1<t2 (b) t1>t2 (c)t1=t2 (d)None of the above

Section – B

2. Answer any two Questions **(2X3=6 Marks)**

1. What is Merge sort. Discuss number of moves and number of comparisons on given array in worst case(50,60,70,80,45,55,65,75).

2. Discuss power of an element (a^n) using Divide and conquer. And writes its recurrence relation.

3. Describe Big-oh and Theta Asymptotic Notations .Write the assumptions of Asymptotic Notations.

SEMESTER EXAMINATION,MAY-2024

Semester:- 4th

PaperCode-TCS-403

Max M

Section – C

3. Attempt any two Questions **(2×5=10 Marks)**

(i) Define algorithm and What are the fundamental characteristics of an algorithm? How to construct better algorithm? Solve this recurrence relation using master theorem

$T(n) = 2T(n/4) + \sqrt{n}$

(ii) What are features of quick sort. Write the algorithm of Quick Sort.

Apply quick sort on given array

(10,10,10,10,10,10,10), write its number of swap and number of comparison.

(iii) Difference between Relative analysis and Absolute analysis. Find max min and solve it using Divide and conquer example :array (10,20,30,1,2,3,11,21,31). Solve this recurrence relation using Substitution method

$T(n) = \begin{cases} T(n-1) + n, & if\ n > 1, \\ 1 & if\ n = 1 \end{cases}$